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Bansal et al.

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(54) **SYSTEM AND METHOD FOR AUTOMATED EMERGENCY CALL BREAKTHROUGH**

(75) Inventors: **Pradeep K. Bansal**, Dayton; **Lee Begeja**, Gillette; **Jeffrey Joseph Farah**, North Brunswick; **Rajesh Kapadia**, Plainsboro; **Bernard S L Renger**, New Providence; **Benjamin J. Stern**, Morristown Township, all of NJ (US)

(73) Assignee: **AT&T Corp**, New York, NY (US)

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(51) **Int. Cl.**[7] **H04M 3/42**; H04M 3/436

(52) **U.S. Cl.** **379/208**; 379/196; 379/218; 379/903

(58) **Field of Search** 379/188, 196, 379/197, 198, 201, 207, 208, 218, 903

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,757,899 * 5/1926 Boulware et al. ..... 379/207 X

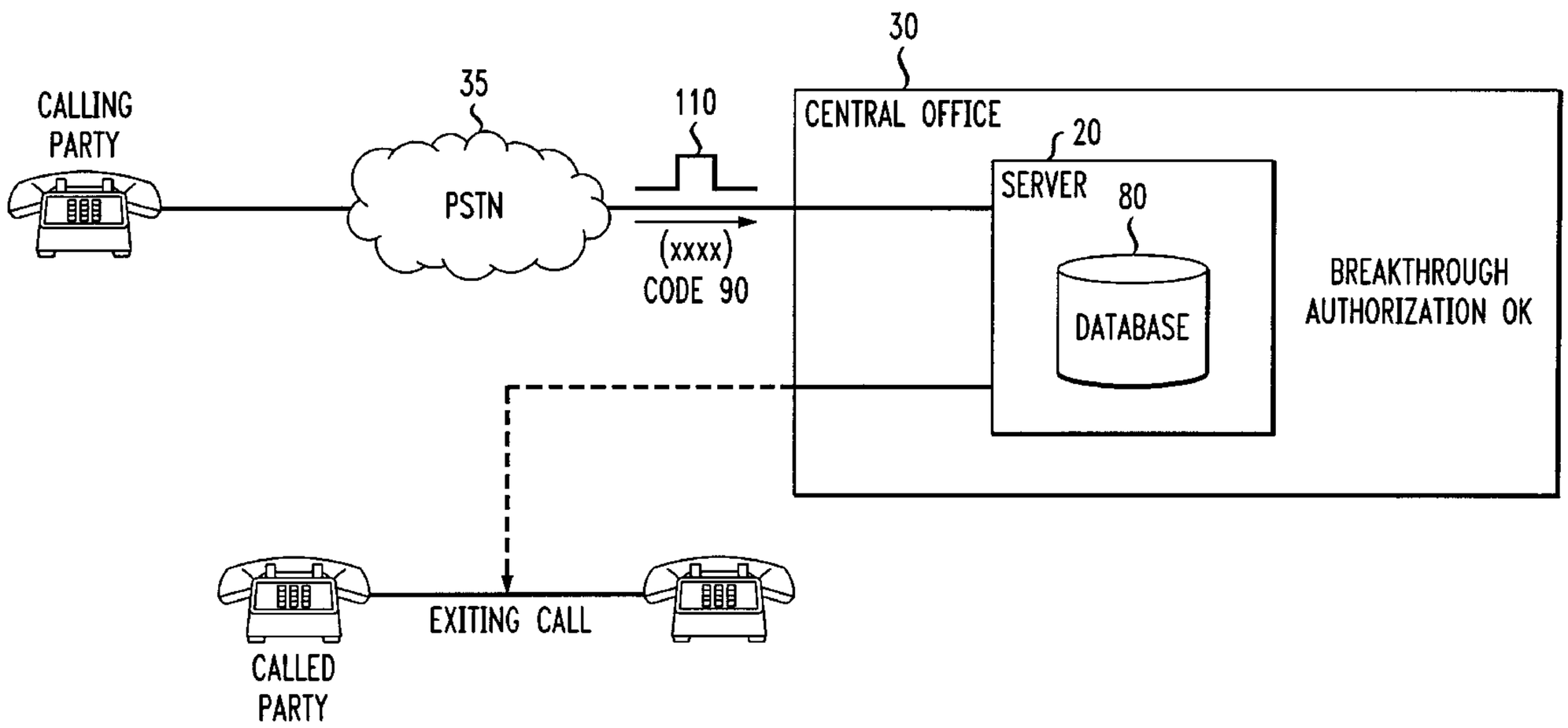
* cited by examiner

Primary Examiner—Harry S. Hong

(57) **ABSTRACT**

An emergency breakthrough system allows users to break through a busy signal, using an automated rather than operator assisted technique. Upon receipt of a busy signal, rather than hanging up and dialing an operator to gain a manual assistance for third party call breakthrough, the calling party is able to keypad an enablement request, such as *85, requesting emergency call breakthrough. After that entry, the system awaits a breakthrough passcode, such as a four digit number, which if validated permits the user to breakthrough the busy signal and reach the called party, without operator intervention. Predesignated numbers can gain automated access by ANI identity of the calling number.

16 Claims, 4 Drawing Sheets



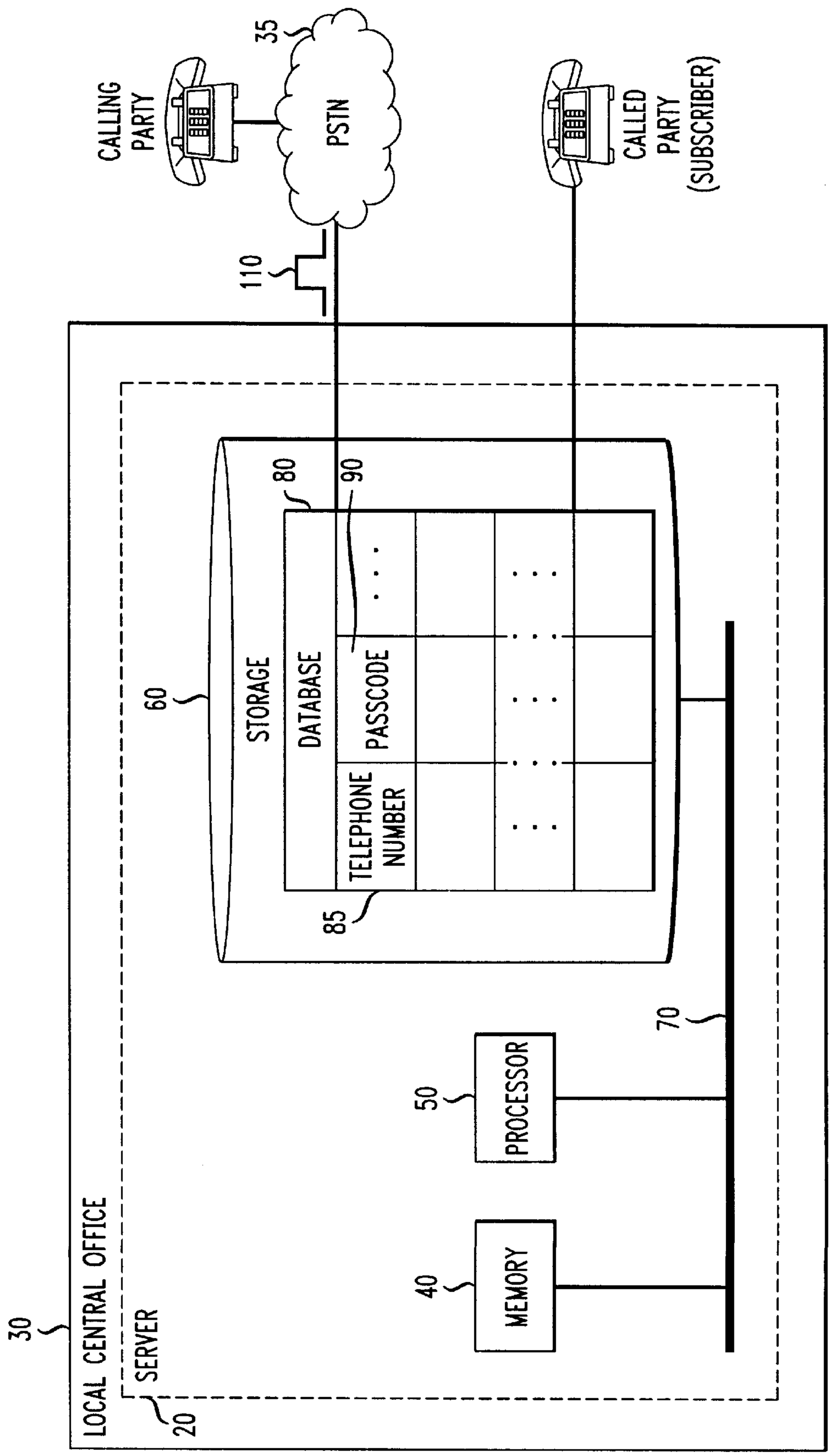
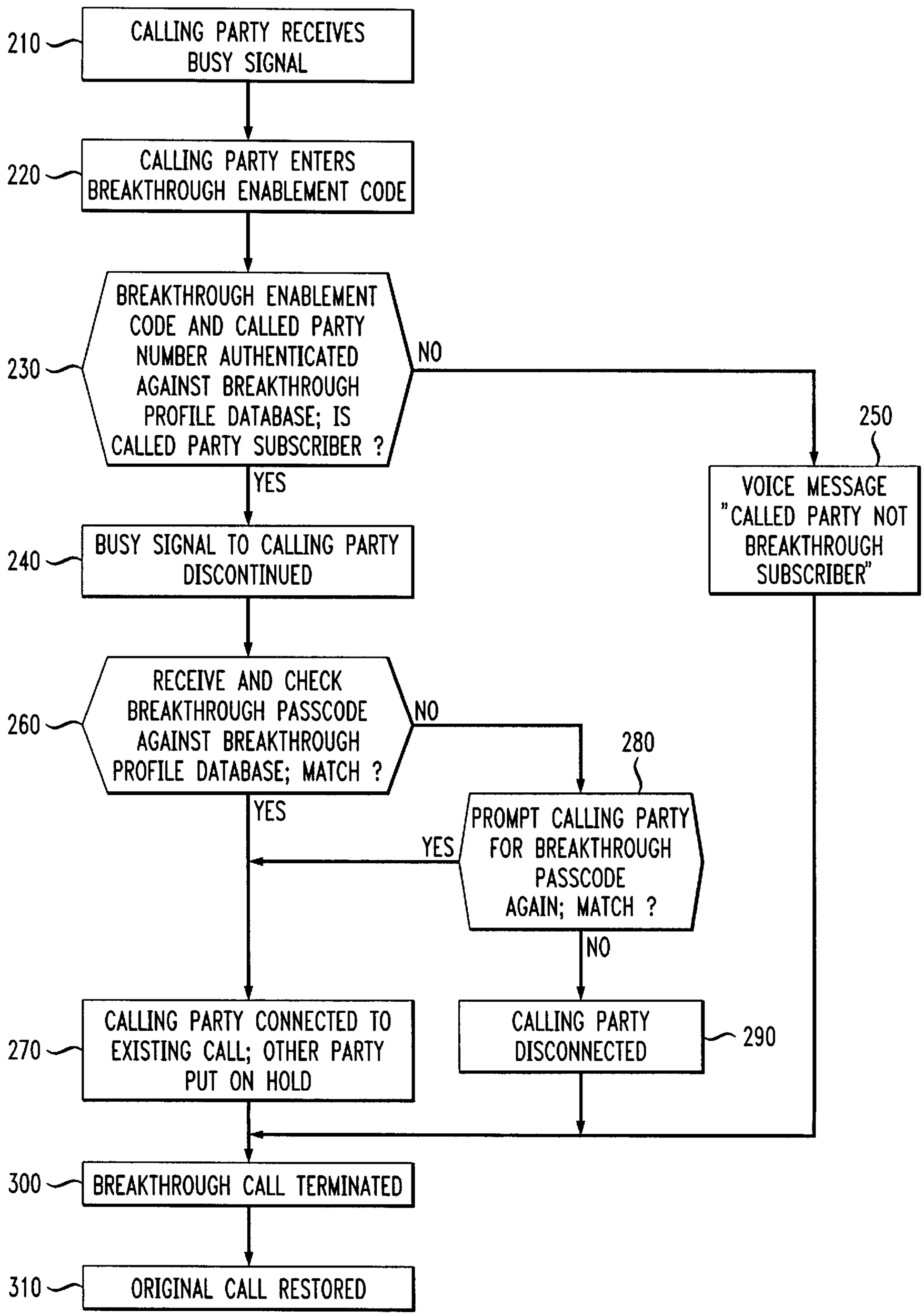

CALLING PARTY
35
PSTN
CALLED PARTY (SUBSCRIBER)
110
LOCAL CENTRAL OFFICE
30
SERVER
20
STORAGE
60
DATABASE
80
TELEPHONE NUMBER
PASSCODE
90
85
PROCESSOR
50
MEMORY
40
70

FIG. 1

FIG. 2


210
CALLING PARTY RECEIVES BUSY SIGNAL
220
CALLING PARTY ENTERS BREAKTHROUGH ENABLEMENT CODE
230
BREAKTHROUGH ENABLEMENT CODE AND CALLED PARTY NUMBER AUTHENTICATED AGAINST BREAKTHROUGH PROFILE DATABASE; IS CALLED PARTY SUBSCRIBER ?
NO
YES
250
VOICE MESSAGE "CALLED PARTY NOT BREAKTHROUGH SUBSCRIBER"
240
BUSY SIGNAL TO CALLING PARTY DISCONTINUED
260
RECEIVE AND CHECK BREAKTHROUGH PASSCODE AGAINST BREAKTHROUGH PROFILE DATABASE; MATCH ?
NO
YES
280
PROMPT CALLING PARTY FOR BREAKTHROUGH PASSCODE AGAIN; MATCH ?
YES
NO
270
CALLING PARTY CONNECTED TO EXISTING CALL; OTHER PARTY PUT ON HOLD
CALLING PARTY DISCONNECTED
290
300
BREAKTHROUGH CALL TERMINATED
310
ORIGINAL CALL RESTORED

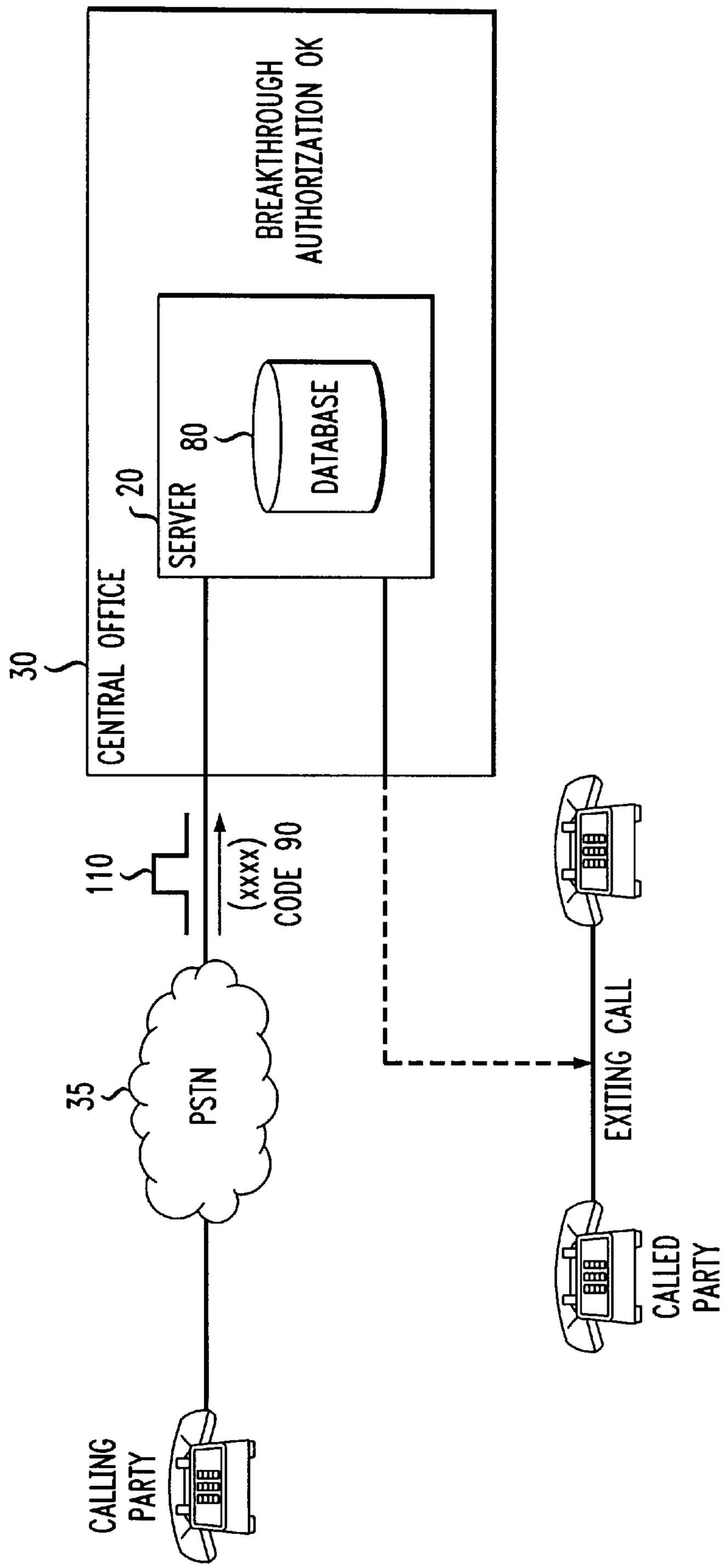

BREAKTHROUGH
AUTHORIZATION OK
SERVER
20
80
DATABASE
CENTRAL OFFICE
30
110
(XXXX)
CODE 90
35
PSTN
EXITING CALL
CALLING
PARTY
CALLED
PARTY

FIG. 3

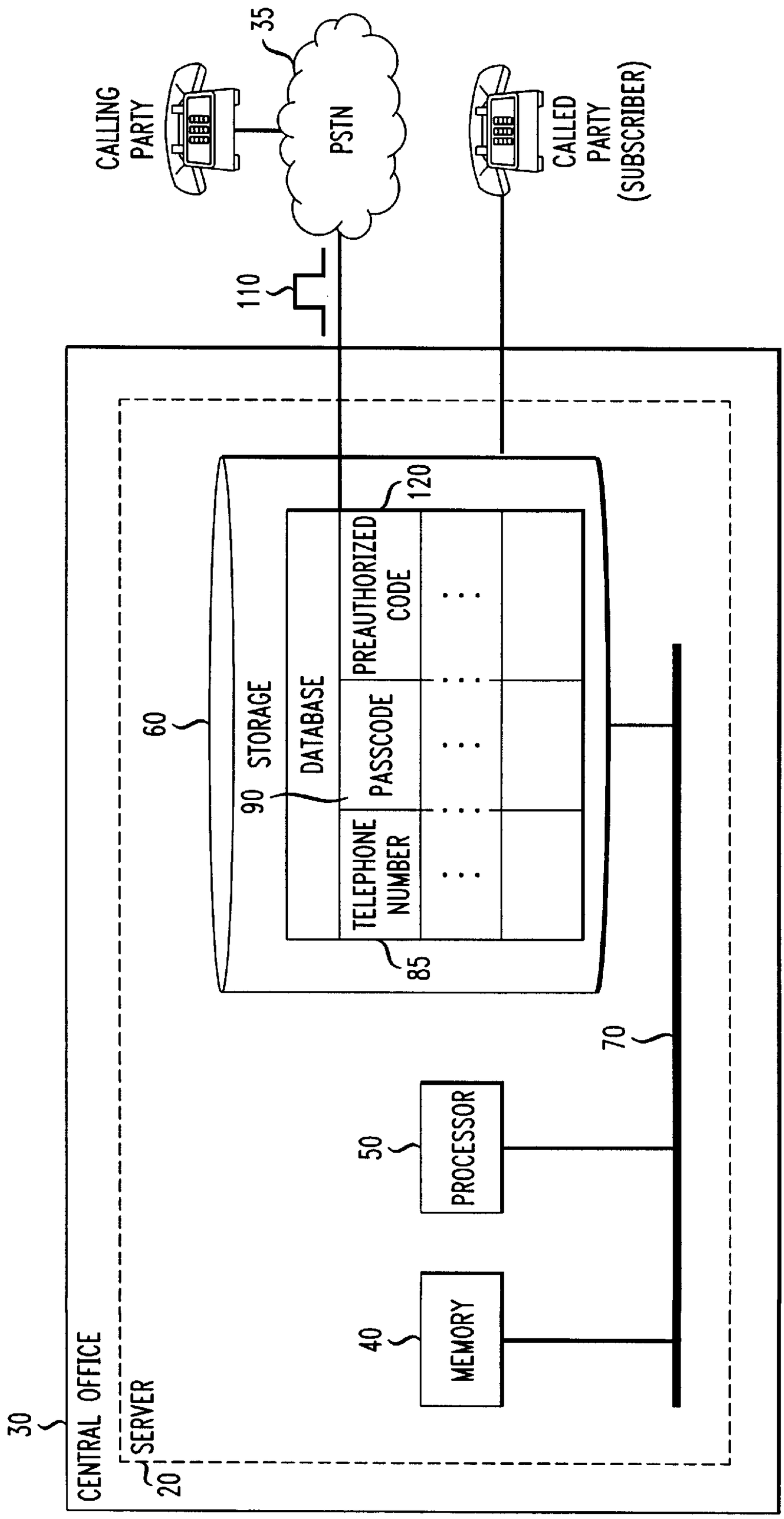

CALLING PARTY
35
PSTN
CALLED PARTY (SUBSCRIBER)
110
120
PREAUTHORIZED CODE
PASSCODE
TELEPHONE NUMBER
60
STORAGE
90
DATABASE
85
70
50
PROCESSOR
40
MEMORY
30
CENTRAL OFFICE
SERVER
20

FIG. 4

SYSTEM AND METHOD FOR AUTOMATED EMERGENCY CALL BREAKTHROUGH

BACKGROUND OF THE INVENTION

1. Field of Invention

The invention relates to the field of communications, and more particularly to an advanced call breakthrough service allowing desired parties to break through a busy telephone signal.

2. Description of Related Art

Emergency breakthrough systems have been available on the public switched telephone network (PSTN) for some time. When a caller desires to reach a telephone number which is producing a busy signal, the caller can currently dial the operator and, for a special charge, have the operator connect the caller into the called party's existing telephone call. However, the available scheme for urgent breakthrough access is cumbersome, and requires several minutes of time to obtain operator assistance and complete the breakthrough transaction. A technique for making emergency call breakthrough quicker, more reliable and more convenient is therefore desirable.

SUMMARY OF THE INVENTION

The invention overcoming these and other problems in the art relates to a system and method for automated emergency breakthrough into an existing telephone call, by which designated parties can enter a predetermined pass code to gain access to a busy called party, all without operator intervention. Called parties subscribing to the service can share their designated passcode with parties they wish to have automated access to this extended functionality, which is faster, more convenient and more controlled than operator-assisted versions.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described with reference to the accompanying drawings, in which like elements are designated with like numbers and in which:

FIG. **1** illustrates a call breakthrough server according to the invention;

FIG. **2** illustrates a flowchart showing call processing according to the invention;

FIG. **3** illustrates the operation of a call breakthrough according to the invention; and

FIG. **4** illustrates an alternative embodiment of a call breakthrough system according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

As illustrated in FIG. **1**, in the system and method of the invention, an emergency call breakthrough server **20**, which may be incorporated in the local central office (CO) **30** of the public phone network, includes processor **40**, electronic memory **50**, storage **60** and electronic bus **70** connecting associated components, as will be appreciated by persons skilled in the art. Each subscriber subscribing to the automated emergency breakthrough service of the invention has an entry in a breakthrough profile database **80**, indicating that this person wishes to have non-assisted breakthrough capability of this type. The breakthrough profile database **80** contains, for each subscriber entry in the database, a breakthrough passcode **90** known only to the subscriber. The subscriber can distribute that breakthrough passcode **90** to persons he or she wishes to have access to the service.

As illustrated in FIG. **3**, when a calling party calls the subscribing party via PSTN **35** and receives for example a busy signal, the central office **30** transmits that conventional signaling to the calling party. However, the central office **30** is configured to receive from the calling party a breakthrough enablement code **110**, for example *85, indicating to the central office that the calling party wishes to access the automated emergency breakthrough system.

Upon receipt of the breakthrough enablement code **110**, central office **30** interfaces with emergency breakthrough server **20** to process an emergency breakthrough request. Upon receipt of a breakthrough enablement code **110**, the central office **30** removes the busy signal tones transmitted to the calling party, and accesses breakthrough profile database **80**. Upon verifying that the called telephone number 85 dialed by the calling party is a subscriber to the automated breakthrough system, the central office **30** removes the busy signal transmitted to the calling party. At this time, breakthrough server **20** awaits entry of a breakthrough passcode, such as a four digit number.

When the calling party keys in a correct breakthrough passcode **90** matching the passcode for the subscriber stored in breakthrough profile database **80**, the central office **30** intervenes in the existing telephone conversation and connects the calling party to the called number. The party on the existing call is given a message, such as "Your party has received an emergency breakthrough call. Please hold, your call will be restored when that call is complete", and their connection is put on hold. Once the telephone call of the calling party who has broken in is complete, the original connection to the called party is restored.

If the breakthrough passcode **90** does not match the passcode associated with the dialed number in breakthrough profile database **80**, the central office **30** plays a brief message asking the calling party to retry, such as "enter your breakthrough passcode again". If properly entered, the calling party is connected, whereas if another incorrect passcode is entered, the calling party is disconnected.

In terms of general call processing, as illustrated in FIG. **2** a calling party dials a called party and receives a busy signal, in step **210**. In step **220**, the calling party enters a breakthrough enablement code. In step **230**, the breakthrough enablement code and called party phone number are authenticated against breakthrough profile database **80**. If the called party is a subscriber, processing proceeds to step **240**, in which the busy signal to the calling party is discontinued. If the called party is not a subscriber, in step **250** the calling party is given a voice message such as "The party you called is not a call breakthrough subscriber" and the call ends. Also, if desired in implementation of the invention the subscriber can enter a breakthrough defeat code, such as *86, on a per-call basis to disable the automatic call breakthrough ability of calling parties, even those with properly authenticated passcodes. This may be accomplished for instance by setting a disablement flag in breakthrough profile database **80** upon receipt of *86 or other codes. In this embodiment, the calling party receives a message such as "The party you called has disabled breakthrough privileges for the present call" or the like.

When the called party is a subscriber, after step **240** the breakthrough server **20** checks the entered breakthrough passcode **90** against breakthrough profile database **80** for that subscriber, in step **260**. If the breakthrough passcode **90** matches, in step **270** the calling party is connected to the existing call, and the party on the existing call is prompted to hold. If breakthrough passcode **90** does not match the

passcode stored for that subscriber, in step **280** the calling party is prompted again to enter breakthrough passcode **90**. If the second entry matches, processing proceeds to step **270** to enter the existing call. If the second entry does not match, the calling party is disconnected in step **290**. After the calling party's call connected at step **270** is finished or the calling party is disconnected in step **290**, in step **300** the interrupting call ends and in step **310**, the original call is restored.

In an alternative embodiment of the invention illustrated in FIG. **4**, the subscriber can choose to include a preauthorized data field **120** in breakthrough profile database **80**. Preauthorized data field **120** consists of a set of telephone numbers of preauthorized parties the subscriber wishes to automatically be granted breakthrough privileges. In this embodiment, the conventional ANI (Automatic Number Identification) code signaling the calling party's number is automatically checked against preauthorized data field **120** in breakthrough profile database **80**. When the calling party's ANI code matches the preauthorized data field **120**, the calling party is directly connected to the subscriber without further querying and input. Calling parties who are not listed on preauthorized data field **120** are presented with the same input queries as in the first embodiment.

Because access to an emergency breakthrough connection to the called party is not processed via operator workstations, and breakthrough setup and processing is handled in an automated server, processing speed is greatly improved compared to the manual case. The calling parties with an urgent need to connect through a busy signal, such as children calling their parents, therefore complete a breakthrough transaction much more quickly and conveniently than using the manually-assisted variety. User convenience and customer satisfaction are increased, all the while allowing the subscriber to the advanced service to control parties able to invoke the automated technique.

The foregoing description of the system and method of the invention is illustrative, and variations in configuration and implementation will occur to persons skilled in the art. For instance, while the breakthrough call has been described in terms of a call process using plain old telephone service (POTS), the invention could be applied to other communication formats such as ISDN, IP (Internet Protocol) telephony, digital telephony or Wireless Communications. The scope of the invention is accordingly intended to be limited only by the following claims.

What is claimed is:

1. A system for providing call breakthrough service, comprising:

a first interface for receiving a request for breakthrough service from a calling party calling a subscriber;

a breakthrough profile database, containing a list of subscribers subscribing to breakthrough service;

a processor, connected to the breakthrough profile database, the processor processing the request for breakthrough service by interrogating the breakthrough profile database to determine the validity of the breakthrough request; and

a second interface, connected to the processor, for connecting the calling party to the subscriber when the breakthrough request is validated.

2. The system of claim **1**, wherein the processor performs breakthrough validation by verifying the subscriber subscribes to the breakthrough service by interrogating the breakthrough profile database, and by verifying a breakthrough password entered by the calling party.

3. The system of claim **1**, wherein a breakthrough profile server is located in a local central office of the public switched telephone network.

4. The system of claim **1**, wherein a breakthrough password is modifiable by the subscriber.

5. The system of claim **1**, wherein the breakthrough service is defeatable by the subscriber on a per-call basis.

6. The system of claim **1**, wherein an original call of the called party is restored after completion of the breakthrough service.

7. The system of claim **1**, wherein a breakthrough profile server is located in an IP telephony network.

8. The system of claim **1**, wherein a breakthrough profile server is located in a wireless network.

9. A method for providing call breakthrough service, comprising:

presenting a first interface for receiving a request for breakthrough service from a calling party to a subscriber;

accessing a breakthrough profile database, containing a list of subscribers subscribing to the breakthrough service;

processing the request for breakthrough service by interrogating the breakthrough profile database to determine the validity of the breakthrough request; and

connecting the party making the breakthrough request to the subscriber when the breakthrough request is validated.

10. The method of claim **9**, wherein the validating is performed by verifying the subscriber subscribes to the breakthrough service by interrogating the breakthrough profile database, and by verifying a breakthrough password entered by the calling party.

11. The method of claim **9**, wherein the breakthrough profile server is located in a local central office of the public switched telephone network.

12. The method of claim **9**, wherein a breakthrough password is modifiable by the subscriber.

13. The method of claim **9**, wherein the breakthrough service is defeatable by the subscriber on a per-call basis.

14. The method of claim **9**, further comprising the step of restoring an original call of the called party after completion of the breakthrough service.

15. The system of claim **9**, wherein a breakthrough profile server is located in an IP telephony network.

16. The system of claim **9**, wherein a breakthrough profile server is located in a wireless network.

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